EXHIBIT “A”

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Applied Ergonomic Report On:

November 28, 2008

Geoffrey Crowther
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Introduction

Mr. Crowther was telephonically interviewed on November 24, 2008. In the analysis of this case, I used standard accepted ergonomic methodology consisting of: 1) work task analysis; 2) assessment of hazard reduction; 3) assessment of medical surveillance; and 4) assessment of education and training. This methodology is recognized by ergonomic authorities including the publication, *Work Related Musculoskeletal Disorders (WMSDs): a reference book for prevention*, 1995, in the National Institute for Occupational Safety and Health (NIOSH)'s *Elements of Ergonomics Programs*, March 1997, and in Occupational Safety and Health Administration (OSHA)'s *Ergonomics: The Study of Work*, 1991, revised 2000. It is also adopted in the Association of American Railroads (AAR) publication, *Ergonomics Programs at Heavy, Industrial Corporations*, February 1994. Further, in the assessment of Mr. Crowther's work tasks, standard ergonomic assessment protocols were utilized, such as checklists recognized by AAR, OSHA and NIOSH and assessment protocol REBA (Rapid Entire Body Assessment). I considered the aforementioned publications, and various AAR publications as well as the following in the preparation of this report:

Material Reviewed

- *Musculoskeletal Disorders and the Workplace-Low Back and Upper Extremities*, National Academy of Science, 2001;
- *Musculoskeletal Disorders and Workplace Factors*, National Institute for Occupational Safety and Health (NIOSH), July 1997;
- Occupational Ergonomics: Work Related Musculoskeletal Disorders of the Upper Limb and Back, Violante, Armstrong & Kilbom, 2000;
- An Evaluation of Railroads Portable Hand Tool Hazards, T.H. Rockwell, Ph.D. and W. S. Marras, Ph.D., December 1985;
- Depositions of Todd Brown taken January 2, 1997, February 21, 2001, and October 16, 2001;
- Depositions of Mark Badders taken February 2, 1997, September 18, 2003, and August 16, 2005;

- Depositions of Joseph Thomasino, M.D., taken October 14, 1991, February 19, 1997 and March 15, 2004;
- Deposition of Heath Weldon, taken November 21, 2002;
- Trial Testimony of Todd Brown in the Ronald Sheridan Case, Court of Common Pleas, Cuyahoga County, OH. March 22, 2006;
- Deposition of William Field, former Manager of Ergonomics for Conrail;
- Deposition of Marcia Comstock, former Corporate Medical Director for Conrail;
- Report of Harvey A. Levine, dated October 2000;
- Association of American Railroad, Ergonomic Guide, 1991;
- Ergonomic Analysis of Trackmen Activities, Jerry P. Purswell and Jeffery C. Woldstand, A Final Report to the Association of American Railroads, July 1, 1991;
- Amended Complaint of Geoffrey C. Crowther, Court of Common Pleas Philadelphia;
- Plaintiff's Answers to Defendant's Back, Upper and Lower Extremity Disorders Interrogatories;
- Plaintiff's Answers to Defendant's Request to Produce;
- Medical records of Steven M. Wenner, M.D.;
- Medical records of Andrew P. Lehman, M.D.;
- Medical records of Robert S. Cowan M.D.;
- Records of John Macatee, D.O.;
- CSXT Job Descriptions of Maintenance of Way Worker and Trackman;
- Ergonomics Programs at Heavy Industrial Corporations, Association of American Railroads, 1994;
- Executive Summary of Burlington Northern Study entitled, "*Getting On and Off Equipment vs. Experiencing Ladder Impacts,*" Prepared by Bill Barbre, presented to the BN Senior Safety and Health Council on July 8, 1992;
- "*Workplace Ergonomics Survey and Analysis of Carpal Tunnel Syndrome Stressors,*" Reily and Stenz, July 1990, the University of Nebraska-Lincoln;
- Job Analysis Summaries for Mr. Crowther's Crafts;
- Deposition of Geoffrey Crowther, November 18, 2008
- CSX Transportation Welder's Manual, January 27, 1997.

Background:

Mr. Crowther is a right-handed male, born May 7, 1951. He was employed by CSXT and its predecessors from 1975 to December of 2006 as a track laborer, track welder, track foreman, gang leader, track inspector and welding foreman. Beginning in 2005, Mr. Crowther had increasing complaints of left hand pain radiating from his left shoulder to his elbow and into his left hand and thumb as well as bilateral knee pain. Dr. Wenner noted that he was experiencing discomfort with lateral bending and rotation. An October 4, 2005 note from Dr. Wenner's associate, Dr. Pacitti, notes that Mr. Crowther is a railroad worker who does a lot of repetitive and heavy use of his hands.

It was noted that he was experiencing intermittent pain in the forearm, elbow, and thumb pain. He was treated conservatively with steroid injections and splint. Following one of the steroid injections to relive his elbow pain, Mr. Crowther began experiencing sudden and severe pain in his neck. Cervical spine x-rays showed C5-6 and C6-7 inner space narrowing with foramina encroachment.

A February 8, 2006, MRI of the cervical spine in response to increasing upper extremity pain revealed multi-level disc bulge, herniation, spur formation and stenosis. Mr. Crowther continued on a conservative course of treatment until the pain symptoms increased such that he was no longer able to work. After consultation with Dr. Robert S. Cowan, M.D., Mr. Crowther underwent cervical spine surgery on January 17, 2007. At that time, Dr. Coawn performed an anterior discectomy with decompression and fusion, with allograft and plate fixation for treatment of severe, multi-level disc herniation and neural foramina stenosis.

On February 14, 2007, Mr. Crowther underwent arthrodesis surgery on his left thumb, performed by Dr. Steven Wenner, M.D. for treatment of advanced arthritis and a degenerative joint condition. An examination of Mr. Crowther by Dr. Lehman on February 28, 2007 showed continued bilateral knee pain, flexion and crepitus problems, his diagnosis confirmed severe bilateral osteoarthritis. Mr. Crowther was also continuing to have pain in his left upper extremity, A March 19, 2007 CT of his left elbow revealed degenerative osteoarthroplasty, loose bodies and lesions. Surgery had been suggested for loose body removal and radial head resection.

Mr. Crowther had a discussion with Dr. Wenner April 13, 2007, regarding work activities and the heavy nature of his work and working conditions at the railroad that could increase risk of injury and Dr. Wenner opined, "that he's had too much orthopedic breakdown (multiple bone and joint problems) to make it sensible for him to return to such heavy labor." On April 17, 2007, Mr. Crowther underwent bilateral total knee replacement (TKR), performed by Andrew Lehman. Mr. Crowther participated in rehabilitation at Heritage Hall and at home following surgery. Throughout 2007, he saw John Macatee, DO for osteopathic manipulative treatments.

In a November 9, 2008, correspondence Dr. Cowan stated, "his employment history was notable for work over the course of 31 years from 1975 to 2006 as a track laborer for a railroad injury. He worked doing heavy duty manual labor, welding, repairing railroad tracks and was exposed to a significant amount of repetitive strenuous motion, vibration, awkward postures, heavy lifting and loading of his axial spine," and continued "it is my opinion, based on a reasonable amount of medical certainty, that Mr. Geoffrey Crowther sustained cumulative micro-trauma to his neck as a result of his strenuous labor on the railroad over the course of 30 years time from 1975 through 2006. The lifting, stooping, bending, awkward postures and vibration all contributed to the progression of this degenerative disc condition and resultant herniations, confirmed on the February 8, 2006 MRI". "In my opinion, Mr. Crowther remains permanently impaired as a result of his injuries and the subsequent surgery based on the AMA guidelines to permanent impairment, he has an 18% whole body impairment rating." Mr. Crowther still has chronic intermittent neck, low back, left elbow, and left knee pain, swelling and stiffness. He further experiences limitations in his daily life due to his medical conditions.

Work History

Mr. Crowther began his railroad career in 1975 as trackman for Penn Central. He then worked for Conrail until the CSXT takeover in June of 1999. Mr. Crowther was a welding foreman, trackman and track inspector from May 1986 to December, 2006. His maintenance of way duties throughout his career were building, repairing and inspecting track. As a welder foreman he was responsible for daily paperwork but also did job of trackman laborer. His last project was hand intensive, hard labor putting in new track in New Bedford, MA from August to October 2005. He spent about 50% of his career on field welding gangs performing thermite welding on ribbon rail, welding frogs, switches and rail defects. He was a track inspector from August 2005 to December 2006. He provided track authority and train safety coordination for work gangs, inspected and repaired track problems. He worked in all weather, constantly cutting away ice in the winter. He performed overhead work in tunnels.

Mr. Crowther operated track vehicles and boom trucks. He frequently used spiking mauls, claw bars, lining bars, jacks, ballast forks, thermite welding equipment, sledgehammers, track chisels, gas/electric welding equipment with MIG/rod, hand and wheelbarrow grinders, hydraulic impact wrenches, stick and wire fed welding equipment.

On the frog repair crew, Mr. Crowther reported 25% of his time was spent as a welder helper. As a welder helper his duties included, but were not limited to, loading the vehicle with the necessary equipment. At the job site he unloaded and assembled the welding cables, the electrode, dug under the track if necessary, the air arc, the air hose, connected the needle gun, the rail chair, necessary hand tools, the carbon blocks, the hydraulic hoses and placed a grinding stone on the side grinder. Mr. Crowther stated that, he would spend an average of 2 hours per shift using a hand held side grinder, plus overtime grinder use, and would observe for trains while the welder cut out and welded the frog. Grinding has been observed to require forceful, repetitive, and awkward deviated postures as well as exposure to vibration. Mr. Crowther indicated that the primary task that caused problems with his neck and upper extremities was using the side grinder. Repairing a typical frog ranged from 3 to 6 1/2 hours and required 4-5 cycles of grinding and welding to complete the repair.

On a regular shift Mr. Crowther performed his welding duties 50% of the time and the other 50% he performed track repair duties, fixing rail, raising track, gauging rail, and working on derailments. These job tasks would require the use of spike mauls, claw bars, lining bars, track jacks, and ballast forks. He would also use hydraulic tampers, spikers, spike pullers, track jacks, impact guns, rail drills, and rail saws. Performing these track repair tasks would require Mr. Crowther to perform manual tasks. Excluding travel time and breaks these tasks required him to use his hands for up to 5.5 to 6.5 hours per shift and with overtime up to 8 hours per shift. During train traffic delays, Mr. Crowther would inspect and repair equipment such as air hoses, the welder or hydraulic equipment. He would change grinding stones on the side grinder or surface grinder if necessary, or change the wire in the wire feed if necessary.

Mr. Crowther reported that while on track crews he did "Sperry Defect" rail replacement, 12 to 40 feet long, cutting the old rail with a rail saw, pulling 20 to 30 spikes, 80 percent with a hydraulic spike puller, and 20 percent by hand with a claw bar. The new rail was cut to size, 1 to 2 cuts, and put into place. The spike holes were plugged with wooden plugs and the rail was then

spiked down, 90% of the spikes were put in using a hydraulic spiker, 10% using a spike maul. A rail drill was used to drill 2 holes in the end of each rail, 8 holes total, the joint bars are then put into place and the bolts are tightened with a hydraulic impact gun. If the rails are a different height they must be ground using a surface grinder and a side grinder. Grinding takes approximately 15 minutes per end and has to be done on approximately 50% of the joints. The track is then gauged and raised. Raising the rail requires a track jack, lifting the tie with a lining bar and tamping the ballast with a hydraulic tamper. This process was usually performed by a crew of 3 or 4 workers and takes 2 to 3 hours to complete. Other track repair jobs included changing stock rail and switch points and installing new frogs.

I have personally observed these tasks being performed by CSXT employees on numerous sites inspections. Many of these tasks have also been examined by others, and published in documents such as, "Ergonomic Analysis of Selected Trackman Activities," AAR, 1991. In the Ashtabula territory (CP 167 to CP 97), I observed and photographed the tools and work processes used by a welder in the repair of a track frog. The tools used included, a Matweld side grinder CP142, with an 8-inch grinding stone, 8,000 RPM, a surface grinder, carbon gauge blocks, a pneumatic needle gun, a chipping hammer, and a wire brush.

The work process included the following: The welder cuts out damaged and fractured metal, which can be a section of damaged frog up to four feet in length. Usually about two feet has to be cut out with an air arc-cutting torch with a carbon rod. A two-foot section requires using an air arc torch for thirty to sixty minutes to cut out the damaged area. Then a side grinder is used for fifteen to thirty minutes to clean the air arc cut section. After metal is removed by air arc by the welder and ground with side grinder by the welder helper, the welder begins the process of rebuilding the frog. Tools used in this process are: wire feed welder; side grinder; needle gun; slag chipping hammer; wire brush; and carbon blocks. The new weld section is finished with a surface grinder, then a side grinder is used to cut the rail slag. The process requires five to seven hours of welding, grinding, and chipping for a two-foot repair. Plus up to one to two hours of set up, maintenance and equipment repair, such as changing grinding wheels one to two times per shift.

Train traffic creates additional side grinding and welding, due to damage caused by the locomotive and the consist crossing over the section being repaired. During the observation of the work process three trains passed through the repair site creating five to ten minute delays in the work process and creating an additional fifteen to twenty five minutes of welding and grinding per train.

The side grinding process was observed to be done in one to five minute intervals with visual inspection and or placement of the carbon blocks. Next, additional wire feed welding is done by the welder for three to five minute intervals, then the needle gun is used to remove the slag from the weld, the chipping hammer is used to remove slag, and carbon gauge blocks are used to gauge the weld building process. The final process of using the top grinder and dressing with side grinder required twenty to forty five minutes. The total time for this process is five to seven hours depending on the length and depth of the repair and the train traffic during the repairs.

I have operated the side grinder and measured the force required to operate it. The force measured ranged from 44 to 49 pounds of downward, forward, and pushing pressure exerted by the right hand and 36 to 41 pounds by the left hand. The knee was also used to apply pressure on the right or left hand and arm to apply additional force during the grinding process. Forces measured in operating the needle gun were 36, 24, 38 and 32 pounds of left and right hand downward and grasping exertion.

The welder is exposed to the following risk factors: repeated and sustained forceful exertions; vibration; cold temperatures; localized contact stress; repetition; and non-neutral awkward postures (particularly the cervical and lumbar spine). This is amplified by the need to use heavy leather welding gloves. (See figures 1 - 8)

Figure 1

Figure 2

Figure 3

Figure 4

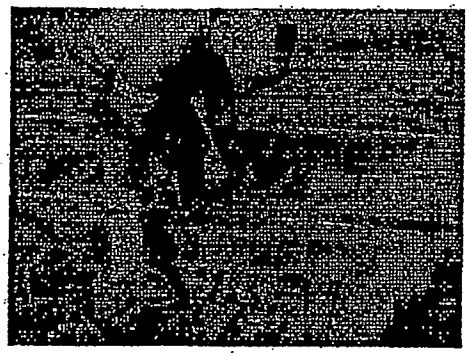

Figure 5

Figure 6

Figure 7

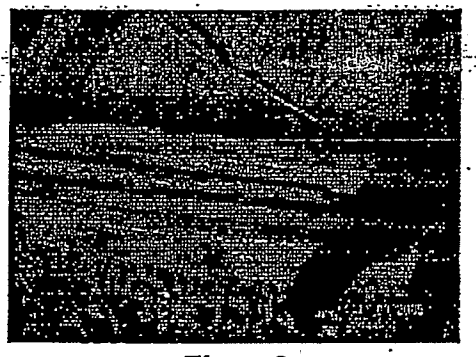

Figure 8

Mr. Crowther's duties included, but were not limited to, loading the high rail welding truck with the necessary equipment for the shift. At the job site, he unloaded and assembled the welding materials, such as a boutet weld pot, claw bar, lining bar, weld shears, surface grinder, side grinder, and other hydraulic and hand tools. Mr. Crowther reported that it would take two men to lift and carry the boutet weld pot and the hydraulic weld shears. He would pull spikes, remove tie plates, dig under the track if necessary, remove ties if required, jack up the rail, cut rail with a rail saw, and perform other tasks in preparation for the welding process. He would change grinding stones on the side grinder or surface grinder if necessary. The boutet welding process involved the following procedure; remove up to 20 spikes, remove rail anchors, remove track joint angle bars on jointed track, cut damage rail with a rail saw, move replacement rail to ties and tie plates, place the boutet weld pot over the track weld, prepare boutet for the melting process, after the melting process remove boutet pot, use hydraulic rail cutter and sledge hammer to chip and cut the weld slag, use surface grinder for smooth and level the weld, use side grinder to contour each side of the weld to the rail, spike tie plates and ties, replace rail anchors, raise ties if needed, load tools back into the truck and move to the next weld area. The welder helper performed work required by hand or hydraulic tools and also did the side grinding and sometimes the surface grinding. The side grinding required ten or more minutes of grinding for each weld.

Mr. Crowther would also perform weld preparation and completion tasks such as raising track and ties, removing and replacing spikes, tie plates, anchors, and ties, as well as moving and replacing lengths of rail. These job tasks would require the use of sledge hammers, spike mauls,

lining bars, claw bars, chisel hammers, rail punches, track wrenches, track jacks, come-a-along, track gauges, tie tongs and ballast forks. He would also use hydraulic tampers, spikers, spike pullers, track jacks, impact guns, rail drills, and rail saws.

Mr. Crowther also worked on jointed and continuous rail, replacing and/or repairing defective rail. The process consisted of cutting out and removing defective rail, replacing the rail and welding the rail joints. Because the high rail welding truck boom hoist was often not operable, the two man gang would have to move and position up to thirteen foot rail sections with hand tools. They worked with eighty five to one hundred thirty six pound rail (weight per three foot section). The duration of each welding tasks varied from one hour to two or more hours.

Mr. Crowther stated that when working a derailment, mostly hand tools were used to repair damaged track, ties and ballast structure. Derailments would be worked until the train movement was restored. They could require up to twenty four hours of continuous work to repair the track. Mr. Crowther estimated that he work over sixty derailments during his career. This does not including rerailing cars in the yards.

Mr. Crowther confirmed the heavy exertional requirements of a trackman and welder. He stated that it was physically hard work that hurt his back, neck, shoulders, knees and arms. He identified the boutet pot, surface and side grinder, the removal of spikes, tamping ballast, moving rail, moving and setting up a rail stretcher, and removing and inserting ties as physically stressful and demanding work tasks. He also stated that the truck mounted boom was too small to be effective in relieving the lifting and carrying of tools, materials and equipment.

The 2001 Matweld catalog includes a 05900 Profile Grinder that is a side grinder mounted in an articulating fixture. The catalog states, "The Matweld Frog/Profile Grinder is a lightweight, precision grinding machine. The grinder is designed for frog and finish grinding of field welds. The roll over feature makes ergonomic grinding of the rail to the original profile easy. An optional detachable Frog Grinding Outrigger is available for the grinding of the Frogs." Similar fixtures are used by other railroad companies, but are apparently not made available to the Conrail or CSXT welding gangs that Mr. Crowther worked with. (Figures 9-11)

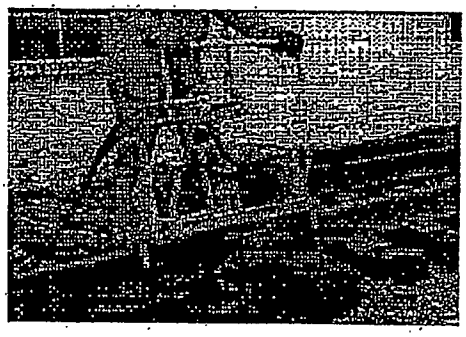

Figure 9

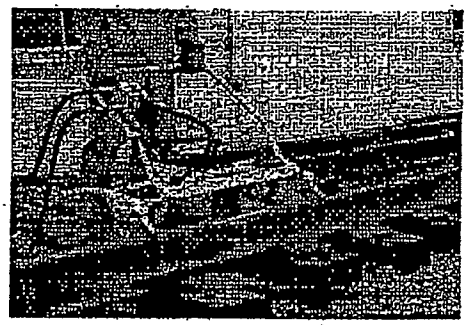

Figure 10

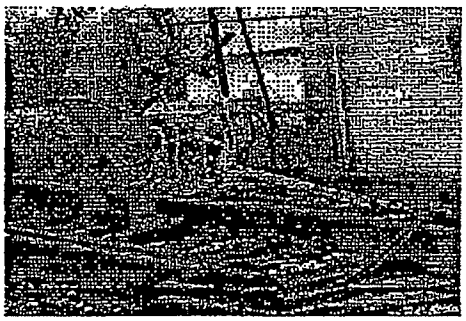

Figure 11

Site Inspection

I have observed a Section Gang digging ballast with a ballast fork or square spade, pulling spikes with a claw bar, spiking rail with a spike maul and a sledge hammer, placing and removing tie plates, removing and inserting ties, gauging rail with lining bars and a come-along, raising track with a track jack, replacing a section of rail, and cutting rail with a rail saw. I have used trackman hand tools and operated trackman hydraulic and pneumatic tools at prior site inspections. Based on prior site inspections and derived data there is no need for a site inspection in the Crowther case.

Hand Tools and Material Weighed, Measured and Photographed:

Sledge Hammers, 10 and 15 pounds;
Lining Bar, 18 pounds, 62 inches long;
Spike Maul, 10 pounds;
Chisel Hammer, 5 pounds;
Rail Punch, 5 pounds;
Track Wrenches, 10 pounds, 42 inches long;
Claw Bar, 30 pounds, 60 inches long;
Ballast Fork and Shovels;
Tie Tongs, 10 pounds;
Pick Axe, 8 pounds;
Adz, 10 pounds;
Mallet, 8 pounds;
Nail punch, 5 pounds;
Track wrench, 2 & 5/8 inch and two-inch open end, 50 inches long, 14 pounds;
Claw Bar, 60 inches long, 22 pounds;
Track Jacks, up to 46 pounds;
Track Joint Bars, 20 to 60 pounds;
Tie Plates, 15 to 20 pounds.
Come-a-Long Track Gauge, 44 pounds;
Orgo Thermite Pot, 36 pounds;

Weld Slag Cut Pipe, 6 and 13 pounds.

Hydraulic Tools and Pneumatic Tools, Weighed, Measured and Photographed:
Rail drill, 100 plus pounds;
Tamper, Matweld, 40 pounds;
Rail Saw, Matweld, 38 pounds
Spike Puller, Matweld, 58 pounds, 32 inches long;
Spiker, Stanley, 62 pounds;
Impact Gun, one-inch drive, 28 pounds;
Side Grinder, Matweld CP142, 18 pounds, 8-inch grinding stone, 8,000 RPM;
Surface Grinder; 73 pounds;
Rail Stretcher, 120 pounds;
Track Joint Bars, 20 to 60 pounds;
Tie Plates, 15 to 20 pounds.
Rail Puller, 125 pounds each;
Rail Gauge Cylinder, 68 pounds;
Rail Shear, 126 pounds.

Railroad and Industry Knowledge of Ergonomic Hazards and Risk Factors

In 1991, OSHA published meatpacking ergonomic guidelines in *Ergonomics Program Management Guidelines for Meatpacking Plants*. OSHA also published *Ergonomics: The Study of Work* in 1991, this was intended for industry generally instead of focusing on meatpacking. Four components of a comprehensive ergonomics program were identified as worksite analysis, hazard prevention and control, training and medical management. Subsequently, in August 1992, OSHA developed an Advanced Notice of Proposed Rulemaking for ergonomics guidelines for general industry based on the meatpacking guidelines (57 Fed Reg 34192). NIOSH published *Elements of Ergonomics Programs* in March 1997, and outlined what a reasonable employer should do to prevent WMSDs. It also provided tools to accomplish the implementation of a proactive ergonomics program.

OSHA has defined a WMSD as an injury to the muscles, joints, tendons or nerves that is caused, or made worse, by work-related risk factors. A basic and generally accepted ergonomic work safety principle is that cumulative trauma is associated with repetitive motions, awkward postures, use of equipment and materials requiring force of exertion or contact stress, the load size, stability, grip, slipperiness, and distance from the worker, and distance moved, absorption of vibration and recoil impact, and exposure to cold. NIOSH *Musculoskeletal Disorders and Work Place Factors*, 1997, also examined the epidemiologic evidence for work related musculoskeletal disorders of the neck, upper extremity and low back. OSHA stated in Ergonomics: The Study of Work, 2000 (revised), that WMSDs generally develops gradually over weeks, months, and years. OSHA stated at page two, "MSDs usually result from exposure to multiple risk factors that can cause or exacerbate the disorders...." Furthermore, various research studies indicate that the highest rates of WMSDs occur in occupations and job tasks with high work demands for intensive exertion, as was experienced in Mr. Crowther's job duties.

Also, the Center for Disease Control publication, Morbidity and Mortality Weekly Report, July 21, 1989, outlined that these factors were related to work induced WMSDs. The National Academy of Science publication, *Musculoskeletal Disorders and the Workplace*, again found, at page 363, "In conclusion, a clear and strong pattern of evidence emerges after considering the epidemiologic, biomechanical, basic science and intervention literature collectively. We can conclude with confidence that there is a relationship between exposure to many workplace factors [i.e. repetition, force, vibration, and the combinations of repetition and force or repetition and cold] and an increased risk of musculoskeletal disorders."

The T. H. Rockwell, Ph.D., and W. S. Marras, Ph.D.'s report to the AAR, *An Evaluation of Railroad Portable Hand Tool Hazards*, December 1985, studied the dangers of hand tools used on the railroad, particularly trackmen, for WMSDs. The Ergonomic Analysis of Selected Trackmen Activities Report to the AAR, 1991, Section 4.1.9 Finishing of Weld, equipment/tools used, states: "Two different grinders are used. The larger grinder is used to even the top of the rail. The smaller grinder is used to smooth off the sides and is often used with an articulating arm." The worker moves the grinder up and down the side of the rail by pulling and pushing on the handles of the grinder, the articulation arm, and sometimes the hose. There are two handles on the articulating arm, which have perpendicular crosspieces at the top to allow the worker to grasp the tools in the orientation he prefers. In section 5.9. Track Joint and Frog Repair the report states: "the welding task was noted for concern with regard to low back problems, and shoulder problems. The bent posture places static loads on the back and the neck. In addition to back and neck problems the finishing task was cited for hand and wrist problems. The combination of force and vibration that were required to perform this task may cause some strain on the muscles and tendons. Descriptors were listed as follows: (f) high force; (p) awkward posture; (r) repetitive motions; (v) vibration. Despite this awareness, I have not seen any evidence that Conrail or CSXT took any responsive action.

The 1991, AAR Ergonomic Guide cited repetition, duration, posture, force of exertion, contact stress, temperature and vibration as factors related to WMSD's and specifically mentioned repetition, posture, force of exertion, contact stress, cold and vibration as risk factors for WMSD's. This study also discussed the importance and effectiveness of using vibration absorbing materials on equipment handles. Also, the National Academy of Science publication, *Musculoskeletal Disorders and the Workplace*, stated in the section on Upper Body Biomechanics (pg. 253) that, "The focus is on the upper body segments or joints (neck, shoulder, elbow, wrist, hands, and fingers). Since the upper arms and neck are mechanically linked, it is therefore not practical to consider them in isolation. This is reflected in the literature focusing on these aspects, which usually treats the neck, shoulders, and upper arms as a functional unit."

Joseph Thomasino, M.D., Chief Medical officer for CSXT until 1994, testified in his depositions on February 19, 1997, March 15, 2004, that he was aware of the relationship of the risk factors and cumulative trauma since the 1970's. Furthermore, various research studies indicate that the highest rates of WMSDs occur in occupations and job tasks with high

work demands for intensive exertion, as was experienced in Mr. Crowther's job duties.

The Railroad's Failure to Provide a Safe Place to Work

OSHA has stated, "no one will ever be able to say that X number of repetitions or lifting X pounds will result in injury or conversely that Y number of repetitions or Y pounds will definitely not result in injury for anyone, any time, anywhere. However, many employers have proven that establishing a systematic program to address such issues as repetition, excessive force, awkward postures and heavy lifting, results in fewer injuries to workers." Based on the above, it is my opinion that the long-term effects of performing the duties of his job with Conrail and CSXT exposed Mr. Crowther to repeated ergonomic risk factors to cervical and lumbar spine and to his lower extremities. It has been known since the 1970's, by ergonomists and by industry, that the more force that is exerted on the joints, the more repetition of loading, and the more frequent non-neutral postures associated with occupational activity, the more one is put at risk for developing WMSDs. Since the 1980's, ergonomists and heavy industry have put into place ergonomic safety programs to reduce and eliminate jobs and job activities that put undue stress on a worker's joints. In 1994 the AAR reviewed ergonomic programs at heavy industrial corporations. It stated that each company studied reported leveled or reduced incident and severity rates of injuries. In *Ergonomics Programs at Heavy, Industrial Corporations*, the AAR identified six elements of a "safety improvement process." These elements are 1) Define and Design the Work Processes; 2) Worksite Analysis And Monitoring; 3) Analysis of Problems and Solution Options; 4) Implementation of Solutions; 5) Training and Education; and 6) Medical Management.

The Burlington Northern Santa Fe Railroad initiated two ergonomic surveys, one by the University of Nebraska-Lincoln, entitled Workplace Ergonomics Survey and Analysis of Carpal Tunnel Syndrome Stressors, July 1990. The other study was done by BIOMEC Services in 1992, and was entitled Body Forces for Getting On and Off Equipment vs. Experiencing Ladder Impacts. After this latter study was produced almost every American railroad stopped the practice of mounting and dismounting moving equipment. However, also in 1992, pursuant to a memorandum from Paul McMahan to Chuck Taylor at AAR, the AAR began actively suppressing the publication of any such research results. Until the railroad provides reliable data that demonstrates that jobs and work tasks such as Mr. Crowther's do not contribute to the development of WMSDs, the scientific evidence from other studies may be considered unrefuted.

Regardless of the knowledge of these studies and conclusions, Conrail and CSXT have failed to provide an effective ergonomic safety program. Todd Brown, former CSXT Director of Occupational Health Programs has consistently stated that he has not found the work at CSXT to encompass significant exposure to the risk factors for the development of WMSDs (Deposition of January 2, 1997, pp. 7-8; Deposition of February 21, 2001, p. 13; Deposition of October 16, 2001, p. 93). He has testified that CSXT has not accepted the theory that exposure to risk factors could cause the development of WMSDs (Deposition of October 16, 2001, p. 54; Deposition of February 21, 2001, pp 43-45). Mark Badders, CSXT Director of Industrial Hygiene testified to his concurrence with Dr. Brown (Deposition of August 16, 2005, pp 109-111 and 144-146). Mr.

Badders attended a weeklong ergonomic course in 1982, which was conducted by the University of Michigan (Deposition of February 19, 1997, pp 11 and 18; Deposition of August 16, 2005, pp 27, 144, and 158). However, he has not put the elements of a comprehensive, proactive ergonomic program into effect at CSXT (Deposition of February 19, 1997, pp. 102-104; Deposition of August 16, 2005, pp 33, 36, 42, and 158-159). Heath Weldon, CSXT Director of General Claims testified that CSXT maintains a database of claims (Deposition p. 7). He did not, however, have discussions with the medical department regarding these claims, nor did he request any assessment of the potential risk to workers.

Since Conrail and CSXT chose to not even recognize that its workers were being exposed to the risk factors for the development of WMSDs, it did not implement any hazard prevention and control measures to reduce the exposure to excessive stress to its workers' joints. In 1991, Dr. Thomasino, who is board certified in occupational medicine (Deposition of February 19, 1997, p.7), stated that when a cluster of employees seem to be developing WMSDs, they will try to investigate the work place to see if there is something in the workplace operations that might be causing them. (Deposition of October 14, 1991, p. 6). In 1997, he stated that any such investigations were the province of Mr. Badders. (Deposition of February 19, 1997, p. 18). However, Mr. Badders had not conducted any investigations since those completed by 1991. (Deposition of February 19, 1997, p. 18). Dr. Thomasino was aware of the aforementioned risk factors for the development of WMSDs; he agreed that reducing exposure to the risk factors would decrease the risk of developing WMSDs. (Deposition of February 19, 1997, p. 37). Although the consultants hired by CSXT to complete the investigations recommended that CSXT provide training to its workers about the risk factors for developing WMSDs, such action was not undertaken. (Badders Deposition of September 18, 2003, pp. 58-59).

From my reading of the depositions of Fields and Comstock, I found that Conrail, apart from looking into switches and several instances of providing a limited group of men with some ergonomic hand tools, did not conduct any type of meaningful work task analysis of its employees' job duties with respect to cumulative trauma injuries.

William Field, Conrail's Manager of Ergonomics, testified that the only work site analysis that had been done was the one pertaining to switches. (10/22/93 Page 123). Mr. Field also testified that the only ergonomic assessment he had done was an assessment of machinists in the power assembly build up area at Juniata in the summer of 1996. (10/17/96 Page 23). When asked, "Conrail does not maintain a safety or hygiene program specifically relating to repetitive motion, vibration, carpal tunnel syndrome or other repetitive motion injuries?" he replied "specifically to those, no". (8/25/98 Page 26). Mr. Field was asked if the literature identifies risk factors , such as force, posture, repetition and vibration with the development of carpal tunnel syndrome or cumulative trauma disorders, and he responded, "The literature about it yes." (8/25/98 Page 18-19). When asked if one of the things he learned at the University of Michigan course in 1987 was about ways to prevent CTS from developing, like cutting down on vibration or cutting down on force, in general, he responded, "They talked about a correlation between those risk factors and CTS." (8/25/98 Page 20). He was further asked if as of 1987, he was personally aware of the general health and safety risks posed by repetitive motions of the hands,

arms and wrists, and he responded "I was aware of the risk factors, yes." (8/25/98 Page 23-24).

Marcia Comstock, Conrail's Medical Director, since 1992, testified that when she came to Conrail in 1992, she was not aware of any programs dealing with carpal tunnel syndrome (CTS) or cumulative trauma disorder. (10/22/93 Page 19). She found nothing in Conrail's records that indicated they had done any type of study, such as the John Deere study for cumulative trauma disorders. (10/22/93 Page 25). In fact nothing was done. Mr. Field was asked about Conrail's ergonomic policy or process. His response was it is in a draft form and has been in a draft form for years. "The employees, the grass root employees have not been given any formal document as far as our ergonomic program or process. The way the document is written it is an upper-management document". (8/25/98 Page 29). As previously mentioned, Mr. Field was asked if Conrail maintained a safety or hygiene program specifically relating to repetitive motion, vibration, CTS or other repetitive motion injuries, and he responded, "specifically those, no". (8/25/98 Page 26)

Conrail and CSXT also failed to meet the standards of an ergonomic program when they failed to train and educate its workers about the risk factors for developing cumulative trauma disorders. Mr. Field was asked in his deposition on August 25, 2003, "can we agree that no warnings have been posted in the various shops on the Consolidated Rail System about risk factors for carpal tunnel syndrome?" A) "That's correct we have not put any warnings up." (Page 44). Q) "Are you aware of studies that have shown a positive association between awkward hand posture and certain hand and wrist disorders, including carpal tunnel syndrome?" A) I'm aware of literature on that." Q) "What steps has Conrail taken to notify all crafts that certain wrist postures could lead to hand and wrist disorders?" A) " We have not put out anything specific as far as posture." (Page 48). With regard to flexing and extending the wrist, Mr. Field stated he was aware of literature that addressed the potential physical musculoskeletal injury risk but made no attempts to notify the grass roots employees at Conrail. (Page 49).

In fact, Conrail and CSXT took no proactive measures to prevent workers from developing WMSDs. Instead, it appears to have followed a policy of do nothing and let the injuries occur and then respond on a case by case basis. In a WMSD case in Cumberland, Maryland, CSXT produced records from its own files indicating its awareness of the occurrence of cumulative trauma disorders and/or repetitive stress injuries, such as carpal tunnel syndrome and other upper extremity injuries, among employees throughout the CSXT system in general. In 1997, CSXT admitted to defending more than 1,600 system wide repetitive stress injury claims.

Further, a report by Harvey A. Levine, dated October 2000, is entitled, The CSX Railroad's Focus On Reducing Maintenance-of-Way Expenses, (1986-1998). In this report, Dr. Levine among other things outlines that CSXT eliminated 4,669 maintenance-of-way employees between 1986 and 1998. This represented 47% of the work force in this area. Similar work force reductions have occurred in the transportation crafts. CSXT did no proactive ergonomic intervention in this area. (p. 7). CSXT did have a safety program, however, this is not a substitute for an ergonomics program. CSXT "empowered" its workers and made them responsible for their own safety.

Conrail and CSXT failed to implement an adequate medical management program to identify and monitor any workers at risk for injury, nor did it train and educate its workers about the risk factors for developing WMSDs. The railroads did not review its medical claims to determine whether or not it had workers being injured. Mr. Crowther did not receive training or education concerning the risk factors for the development of WMSDs. Conrail and CSXT could have taken the course of a prudent employer and erred on the side of caution. CSXT did provide documentation that it had over 1600 repetitive injury claims by its present or former employees. There is, however, no evidence that an analysis of these claims was conducted to determine if ergonomic intervention might reduce future injuries .

Dr. Brown was employed by the AAR before he became CSXT's director of occupational health programs. (Deposition of October 16, 2002, pp 9-22). He even helped develop AAR training packages for implementing ergonomic programs. (Deposition of October 16, 2002, pp. 21-24). At CSXT, however, he did not follow the AAR recommendations. He did not complete a job analysis checklist for cumulative trauma disorders to screen maintenance of way job duties or equipment operator work tasks for ergonomic risk factors; he did not perform an analysis of corporate health and safety data. Rather, he developed, Work Characterization Analyses, which has no useful ergonomic or safety purpose. The characterization studies only usefulness and their only application have been attempting to defend CSXT in injury claims. CSXT issued brochures such as, "Slip, Trip and Fall Prevention" and showed films on proper lifting techniques. It then would assume that if an employee was injured, he had performed an unsafe action and had violated some safety rule.

Mr. Crowther's work tasks were evaluated with several ergonomic checklists and assessment tools including the AAR Checklists found in AAR's Basic *Ergonomics: Principles and Techniques* (1992) for Manual Material Handling, Cumulative Trauma Disorders, Temperature Extremes and Physical Fatigue. Assessment of Mr. Crowther's work tasks based on these checklists indicates the following 1) that a more thorough evaluation of low-back injury risks was needed 2) a more thorough evaluation of work methods, tools and equipment was needed to identify the causes of repetition, awkward postures and high forces, 3) a thorough evaluation of the demands of physical work should be done. Similarly, applied the "General Ergonomic Risk Analysis Checklist" included in NIOSH's *Elements of Ergonomic Programs* to Mr. Crowther's work tasks indicates that ergonomic risk factors were clearly present. Mr. Crowther's work tasks were also analyzed with an analysis method called the Rapid Entire Body Assessment tool (REBA). His REBA score of 21is indicative of the very high risk level requiring a need for an immediate level of action.

Conclusions

My conclusions are as follows:

1. It has been known since the 1970's, by ergonomists/human factors engineers and by industry, that the more force that is exerted on the joints, the more repetition of loading, the more frequent non-neutral postures associated with occupational activity, and the more exposure to

vibrating equipment the more one is put at risk for developing WMSDs.

2. Since the 1980's, heavy industry has put into place ergonomic safety programs to reduce and eliminate jobs and job activities that put undo stress on a worker's joints. The elements of such an ergonomic safety program are:

a) Work site analysis;
b) Hazard and prevention control;
c) Medical Management; and
d) Worker training and education (source: *Elements of Ergonomics Programs,* March 1997, NIOSH).

3. As described above, Mr. Crowther, while performing his job with Conrail and CSXT was exposed to the above-cited risk factors for the development of WMSDs.

4. CSXT and Conrail did not meet industry standards with an adequate ergonomic program in regards to Mr. Crowther because:

a) Conrail and CSXT did not do any systematic work task analysis of Mr. Crowther's job to see if performing his job duties posed any risk of injury;

b) Conrail and CSXT did not implement any hazard prevention and control measures in Mr. Crowther's job to reduce his exposure to the above-cited risk factors for the development of WMSDs, despite their awareness of company wide injury claims, some with the same job duties and work tasks as Mr. Crowther;

c) Conrail and CSXT failed to implement medical management programs to identify and monitor workers at risk for injury. I found no Conrail or CSXT medical management program under which they examined possible modification of Mr. Crowther's work tasks that may have reduced or prevented the development of his symptoms;

d) Finally, Conrail and CSXT failed to train and educate Mr. Crowther about the risk factors for developing WMSDs; instead it left Mr. Crowther unable to participate in his own protection.

Thus, my opinion to a reasonable degree of ergonomic certainty is that Mr. Crowther, while performing his job with the railroad, was exposed to the risk factors associated with the development of WMSDs. Conrail and CSXT did not have an adequate ergonomic work safety program that met industry standards to address and reduce these risk factors. It is my opinion, within a reasonable ergonomic certainty, that both Conrail and CSXT failed act as a prudent employer and failed to provide Mr. Crowther with a reasonably safe place to work.

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